

1    1.    A powder adapted for three-dimensional printing, the powder comprising a blend  
2    of:

3              a thermoplastic particulate material; and  
4              an adhesive particulate material,  
5              wherein the adhesive particulate material is adapted to bond the thermoplastic  
6    particulate material when a fluid activates the adhesive particulate material.

1              2.    The powder of claim 1 wherein the fluid is aqueous.

1              3.    The powder of claim 2 wherein the adhesive particulate material  
2    comprises the thermoplastic particulate material, such that the thermoplastic particulate  
3    material is at least sparingly soluble and adhesive in the activating fluid and is adapted to  
4    bond together when the fluid activates the thermoplastic particulate material by at least  
5    partially dissolving the thermoplastic particulate material and the thermoplastic  
6    particulate material is selected from the group consisting of acetal polyoxymethylene,  
7    polylactide, polyethylene, polypropylene, ethylene vinyl acetate, polyphenylene ether,  
8    ethylene-acrylic acid copolymer, polyether block amide, polyvinylidene fluoride,  
9    polyetherketone, polybutylene terephthalate, polyethylene terephthalate,  
10   poly(cyclohexylenemethylene terephthalate, polyphenylene sulfide, polythalamide,  
11   polymethylmethacrylate, polysulfones, polyethersulfones, polyphenylsulfones,  
12   polyacrylonitrile, poly(acrylonitrile-butadiene-styrene), polyamides, polycondensates of  
13   urea-formaldehyde, polystyrene, polyolefin, polyvinyl butyral, polycarbonate, polyvinyl  
14   chloride, polyethylene terephthalate, ethyl cellulose, hydroxyethyl cellulose,  
15   hydroxypropyl cellulose, methyl cellulose, cellulose acetate, hydroxypropylmethyl  
16   cellulose, hydroxybutylmethyl cellulose, hydroxyethylmethyl cellulose,  
17   ethylhydroxyethyl cellulose, cellulose xanthate, and combinations and copolymers  
18   thereof.

1              4.    The powder of claim 2 wherein the fluid that activates the thermoplastic  
2    particulate material is adapted to be solidifiable by exposure to at least one of ultraviolet  
3    light, visible light, heat, and electron beam, and combinations thereof.

1              5.    The powder of claim 1 wherein the fluid is non-aqueous.

1       6.     The powder of claim 5 wherein the fluid is non-halogenated.

1       7.     The powder of claim 1 wherein the thermoplastic particulate material comprises  
2     particles having a mean particle diameter of about 10 micrometers to about 100  
3     micrometers.

1       8.     The powder of claim 1 wherein the thermoplastic particulate material comprises a  
2     thermoplastic material selected from the group consisting of acetal polyoxymethylene,  
3     polylactide, polyethylene, polypropylene, ethylene vinyl acetate, polyphenylene ether,  
4     ethylene-acrylic acid copolymer, polyether block amide, polyvinylidene fluoride,  
5     polyetherketone, polybutylene terephthalate, polyethylene terephthalate,  
6     polycyclohexylenemethylene terephthalate, polyphenylene sulfide, polythalamide,  
7     polymethylmethacrylate, polysulfones, polyethersulfones, polyphenylsulfones,  
8     polyacrylonitrile, poly(acrylonitrile-butadiene-styrene), polyamides, polycondensates of  
9     urea-formaldehyde, polystyrene, polyolefin, polyvinyl butyral, polycarbonate, polyvinyl  
10    chlorides, polyethylene terephthalate, ethyl cellulose, hydroxyethyl cellulose,  
11    hydroxypropyl cellulose, methyl cellulose, cellulose acetate, hydroxypropylmethyl  
12    cellulose, hydroxybutylmethyl cellulose, hydroxyethylmethyl cellulose,  
13    ethylhydroxyethyl cellulose, cellulose xanthate, and combinations, and copolymers  
14    thereof.

1       9.     The powder of claim 1 wherein the adhesive particulate material comprises  
2     particles having a mean particle diameter of about 10 micrometers to about 100  
3     micrometers.

1       10.    The powder of claim 1 wherein the adhesive particulate material comprises a resin  
2     selected from the group consisting of water-soluble resins and alkaline-reducible resins  
3     and the fluid activates the adhesive particulate material by dissolving the adhesive  
4     particulate material.

1       11.    The powder of claim 10 wherein the resin is selected from the group consisting of  
2     maltodextrin, polyvinyl alcohol, sulfonated polyester polymer, sulfonated polystyrene,  
3     octylacrylamide/acrylate/ butylaminoethyl methacrylate copolymer,

4 acrylates/octylacrylamide copolymer, polyacrylic acid, polyvinyl pyrrolidone, styrenated  
5 polyacrylic acid, polyethylene oxide, sodium polyacrylate, sodium polyacrylate  
6 copolymer with maleic acid, polyvinyl pyrrolidone copolymer with vinyl acetate,  
7 butylated polyvinylpyrrolidone, polyvinyl alcohol-co-vinyl acetate, starch, modified  
8 starch, cationic starch, pregelatinized starch, pregelatinized modified starch,  
9 pregelatinized cationic starch, and combinations and copolymers thereof.

1 12. The powder of claim 1 wherein the adhesive particulate material comprises an  
2 inorganic adhesive.

1 13. The powder of claim 12 wherein the inorganic adhesive is selected from the group  
2 consisting of plaster, bentonite, precipitated sodium silicate, amorphous precipitated  
3 silica, amorphous precipitated calcium silicate, amorphous precipitated magnesium  
4 silicate, amorphous precipitated lithium silicate, salt, portland cement, magnesium  
5 phosphate cement, magnesium oxychloride cement, magnesium oxysulfate cement, zinc  
6 phosphate cement, zinc oxide – eugenol cement, aluminum hydroxide, magnesium  
7 hydroxide, calcium phosphate, sand, wollastonite, dolomite, amorphous precipitated  
8 silicates comprising at least two types of ions selected from the group consisting of  
9 sodium ions, lithium ions, magnesium ions, and calcium ions, and combinations thereof.

1 14. The powder of claim 1, further comprising:  
2 a filler material.

1 15. The powder of claim 14 wherein the filler material comprises an inorganic  
2 material.

1 16. The powder of claim 15 wherein the inorganic material is selected from the group  
2 consisting of aluminum oxide, soda-lime glass, borosilicate glass, silica, aluminosilicate  
3 ceramic, limestone, plaster, bentonite, precipitated sodium silicate, amorphous  
4 precipitated silica, amorphous precipitated calcium silicate, amorphous precipitated  
5 magnesium silicate, amorphous precipitated lithium silicate, salt, portland cement,  
6 magnesium phosphate cement, magnesium oxychloride cement, magnesium oxysulfate  
7 cement, zinc phosphate cement, zinc oxide - eugenol cement, aluminum hydroxide,

8       magnesium hydroxide, calcium phosphate, sand, wollastonite, dolomite, amorphous  
9       precipitated silicates comprising at least two ions selected from the group consisting of  
10      sodium ions, lithium ions, magnesium ions, and calcium ions, and combinations thereof.

1       17.     The powder of claim 14 wherein the filler material comprises an organic material.

1       18.     The powder of claim 17 wherein the organic material comprises a carbohydrate.

1       19.     The powder of claim 18 wherein the carbohydrate is selected from the group  
2       consisting of starch, modified starch, cellulose, maltodextrin, acacia gum, locust bean  
3       gum, pregelatinized starch, acid-modified starch, hydrolyzed starch, sodium  
4       carboxymethylcellulose, sodium alginate, hydroxypropyl cellulose, methyl cellulose,  
5       chitosan, carrageenan, pectin, agar, gellan gum, gum Arabic, xanthan gum, propylene  
6       glycol alginate, guar gum, and combinations thereof.

1       20.     The powder of claim 17 wherein the organic material comprises a protein.

1       21.     The powder of claim 20 wherein the organic material is selected from the group  
2       consisting of gelatin, rabbit-skin glue, soy protein, and combinations thereof.

1       22.     The powder of claim 1, further comprising:  
2               a processing aid material.

1       23.     The powder of claim 1, further comprising:  
2               a reinforcing fiber.

1       24.     The powder of claim 1, further comprising:  
2               a filler material; and  
3               a processing aid material.

1       25.     A fluid for three-dimensional printing, the fluid comprising:  
2               a first solvent having a first boiling point,  
3               wherein the fluid is adapted to activate an adhesive in a powder comprising a  
4       blend of a thermoplastic particulate material and an adhesive particulate material.

1    26.    The fluid of claim 25 wherein the fluid is adapted to activate the adhesive by  
2    dissolving the adhesive particulate material.

1    27.    The fluid of claim 25 wherein the first solvent is selected from the group  
2    consisting of ethanol, isopropanol, n-propanol, methanol, n-butanol, a glycol, an ester, a  
3    glycol-ether, a ketone, an aromatic, an aliphatic, an aprotic polar solvent, a terpene, an  
4    acrylate, a methacrylate, a vinylether, an oxetane, an epoxy, a low molecular weight  
5    polymer, carbonate, n-methylpyrrolidone, acetone, methyl ethyl ketone, dibasic esters,  
6    ethyl acetate, dimethyl sulfoxide, dimethyl succinate, and combinations thereof.

1    28.    The fluid of claim 25, further comprising:  
2         a second solvent having a second boiling point.

1    29.    The fluid of claim 28 wherein the second boiling point is higher than the first  
2    boiling point.

1    30.    The fluid of claim 28 wherein the second solvent is water-miscible.

1    31.    The fluid of claim 30 wherein the second water-miscible solvent is selected from  
2    the group consisting of butyrolactone, glycerol carbonate, propylene carbonate, ethylene  
3    carbonate, dimethyl succinate, dimethyl sulfoxide, n-methyl pyrrolidone, glycerol,  
4    1,4 butane diol, polyethylene glycol, diethylene glycol butyl ether, ethylene glycol,  
5    diethylene glycol, propylene glycol, polypropylene glycol, polyethylene glycol ethers  
6    polypropylene glycol ethers, tetraethyleneglycol ethers, butylene carbonate, pentanediol,  
7    hexanediol, and combinations thereof.

1    32.    The fluid of claim 25, further comprising:  
2         water.

1    33.    The fluid of claim 32 wherein the first solvent is water-miscible.

1    34.    The fluid of claim 32, further comprising:  
2         a second solvent having a second boiling point,  
3         wherein the second solvent is water-miscible.

1    35.    The fluid of claim 34 wherein the second boiling point is higher than the first  
2    boiling point.

1    36.    The fluid of claim 25, further comprising:  
2         a surfactant.

1    37.    The fluid of claim 25, further comprising:  
2         a rheology modifier.

1    38.    The fluid of claim 25, further comprising:  
2         an amine.

1    39.    The fluid of claim 38 wherein the amine is selected from the group consisting of  
2         monoisopropanol amine, triethylamine, 2-amino-2-methyl-1-propanol, 1-amino-2-  
3         propanol, 2-dimethylamino-2-methyl-1-propanol, N,N-diethylethanolamine, N-  
4         methyldiethanolamine, N,N-dimethylethanolamine, triethanolamine, 2-aminoethanol, 1-  
5         [bis[3-(dimethylamino)propyl]amino]-2-propanol, 3-amino-1-propanol, 2-(2-  
6         aminoethylamino)ethanol, tris(hydroxymethyl)aminomethane, 2-amino-2-ethyl-1,3-  
7         propanediol, 2-amino-2-methyl-1,3-propanediol, diethanolamine, 1,3-  
8         bis(dimethylamino)-2-propanol, ammonium hydroxide, monoethanolamine,  
9         aminomethylpropanol, aminoethylethanolamine, triisopropanolamine,  
10      polyoxypropyleneetriamine, polyethyleneimine, and combinations thereof.

1    40.    A fluid for three-dimensional printing, the fluid comprising:  
2         a solvent,  
3         wherein the fluid is adapted to activate the adhesive properties of at least a  
4         sparingly soluble thermoplastic particulate material.

1    41.    The fluid of claim 40 wherein the fluid is non-aqueous.

1    42.    The fluid of claim 41 wherein the fluid is non-halogenated.

1    43.    The fluid of claim 42, wherein the solvent is selected from the group consisting of  
2         an alcohol, a glycol, an ester, a glycol-ether, a ketone, an aromatic, an aliphatic, an

3 aprotic polar solvent, a terpene, an acrylate, a methacrylate, a vinylether, an oxetane, an  
4 epoxy, a low molecular weight polymer, carbonate, and combinations thereof.

1 44. The fluid of claim 43 wherein the alcohol is selected from the group consisting of  
2 methanol, ethanol, n-propanol, i-propanol, n-butanol, and combinations thereof.

1 45. The fluid of claim 43 wherein the glycol is selected from the group consisting of  
2 ethylene glycol, diethyleneglycol, propylene glycol, polyethyleneglycol, butanediol,  
3 pentanediol, hexanediol, and combinations thereof.

1 46. The fluid of claim 43 wherein the ester is selected from the group consisting of  
2 ethylacetate, propyleneglycol methylether acetate, amyl acetate, dimethylsuccinate,  
3 dimethyl glutarate, dimethyl adipate, diethylene glycol monobutyl ether acetate, n-propyl  
4 acetate, i-propyl acetate, i-butyl acetate, n-butyl acetate, t-butyl acetate, 2-ethylhexyl  
5 acetate, ethylene glycol diacetate, diethyl succinate, methyl lactate, ethyl lactate,  
6 dimethyl tartrate, diethyl tartrate, and combinations thereof.

1 47. The fluid of claim 43 wherein the glycol-ether is selected from the group  
2 consisting of dipropylene glycol methyl ether, diethylene glycol butyl ether, diethylene  
3 glycol monoethyl ether, propylene glycol methyl ether, ethylene glycol propyl ether, and  
4 combinations thereof.

1 48. The fluid of claim 43 wherein the ketone is selected from the group consisting of  
2 acetone, methylethylketone, methylisobutylketone, methyl isopropyl ketone, methyl n-  
3 propyl ketone, methyl isoamyl ketone, methyl n-amyl ketone, diisobutyl ketone, and  
4 combinations thereof.

1 49. The fluid of claim 43 wherein the aromatic is selected from the group consisting  
2 of toluene, xylene, phenol, benzene, styrene, high flash aromatic naptha, and  
3 combinations thereof.

1 50. The fluid of claim 43 wherein the aliphatic is selected from the group consisting  
2 of hexane, heptane, cyclohexane, and combinations thereof.

1    51.    The fluid of claim 43 wherein the aprotic polar solvent is selected from the group  
2    consisting of n-methylpyrrolidone, dimethylsulfoxide, 2-pyrrolidone, butyrolactone, and  
3    combinations thereof.

1    52.    The fluid of claim 43 wherein the terpene comprises limonene.

1    53.    The fluid of claim 43 wherein the acrylate is selected from the group consisting of  
2    alkoxylated difunctional acrylate, 2-phenoxyethyl acrylate, tetrahydrofurfuryl acrylate,  
3    2(2 ethoxyethoxy)ethyl acrylate, hexanediol diacrylate, propoxylated neopentyl glycol  
4    diacrylate, lauryl acrylate, isodecyl acrylate, tridecyl acrylate, isobornyl acrylate,  
5    tripropylene glycol diacrylate, stearyl acrylate, allyl acrylate, iso octyl acrylate,  
6    caprolactone acrylate, alkoxylated tetrahydrofurfuryl acrylate, butanediol diacrylate, 1,3-  
7    butyleneglycol diacrylate, diethylene glycol diacrylate, polyethylene glycol diacrylate,  
8    alkoxylated hexane diol diacrylate, alkoxylated cyclohexane dimethanol diacrylate,  
9    cyclohexane dimethanol diacrylate, dipropylene glycol diacrylate, ethoxylated bisphenol  
10   A diacrylate, neopentyl glycol diacrylate, alkoxylated aliphatic diacrylate,  
11   trimethylpropane triacrylate, tris (2-hydroxy ethyl) isocyanurate triacrylate, ethoxylated  
12   trimethyl propane triacrylate, propoxylated trimethyl propane triacrylate, propoxylated  
13   glyceryl triacrylate, pentaerythritol tetraacrylate, pentaerythritol triacrylate, di-  
14   trimethylpropane tetraacrylate, dipentaerythritol pentaacrylate, ethoxylated  
15   pentaerythritol tetraacrylate, alkoxylated nonyl phenol acrylate, and combinations  
16   thereof.

1    54.    The fluid of claim 43 wherein the methacrylate is selected from the group  
2    consisting of 2-phenoxyethyl methacrylate, tetrahydrofurfuryl methacrylate, hexanediol  
3    dimethacrylate, lauryl methacrylate, isodecyl methacrylate, tridecyl methacrylate,  
4    isobornyl methacrylate, propylene glycol monomethacrylate, stearyl methacrylate, allyl  
5    methacrylate, iso octylmethacrylate, butanediol dimethacrylate, 1,3-butyleneglycol  
6    dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate,  
7    triethylene glycol dimethacrylate, tetraethylene glycol dimethacrylate, polyethylene  
8    glycol dimethacrylate, cyclohexane dimethanol dimethacrylate, dipropylene glycol  
9    dimethacrylate, ethoxylated bisphenol A dimethacrylate, neopentyl glycol

10 dimethacrylate, trimethylpropane trimethacrylate, methoxy polyethylene glycol  
11 methacrylate, alkoxylated nonyl phenol methacrylate, ethoxylated hydroxyethyl  
12 methacrylate, allyl methacrylate, propoxylated allyl methacrylate, and combinations  
13 thereof.

1 55. The fluid of claim 43 wherein the vinyl ether is selected from the group consisting  
2 of hydroxylbutyl vinyl ether, triethyleneglycol divinylether, cyclohexanediethanol  
3 divinylether, propenylether of propylene carbonate, dodecylvinylether,  
4 cyclohexanemethanol monovinylether, cyclohexyl vinyl ether, diethyleneglycol  
5 divinylether, 2-ethylhexylvinylether, dipropyleneglycol divinylether, tripropyleneglycol  
6 divinyl ether, hexanediol divinyl ether, octadecylvinylether, butane diol divinyl ether,  
7 bis[4-(vinyloxy)butyl] isophthalate, bis[4-(vinyloxy)butyl] adipate, and combinations  
8 thereof.

1 56. The fluid of claim 43 wherein the oxetane is selected from the group consisting of  
2 3-ethyl-3-hydroxymethyl-oxetane, 1,4-bis[(3-ethyl-3-oxetanyl methoxy)methyl]benzene,  
3 and combinations thereof.

1 57. The fluid of claim 43 wherein the epoxy is selected from the group consisting of  
2 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate, bis-(3,4-  
3 epoxycyclohexyl) adipate, limonene monoxide, 1,2-epoxyhexadecane, and combinations  
4 thereof.

1 58. The fluid of claim 43 wherein the low molecular weight polymer comprises  
2 polyethyleneimine.

1 59. The fluid of claim 43 wherein the carbonate comprises ethylene carbonate,  
2 propylene carbonate, butylene carbonate, glycerol carbonate, and combinations thereof.

1 60. A fluid for three-dimensional printing, the fluid comprising:  
2 water, and  
3 a second solvent having a second boiling point,  
4 wherein the fluid is adapted to activate an adhesive in a powder comprising a blend of a  
5 thermoplastic particulate material and an adhesive particulate material.

1       61.     The fluid of claim 60 wherein the second solvent is selected from the group  
2     consisting of butyrolactone, glycerol carbonate, propylene carbonate, ethylene carbonate,  
3     dimethyl succinate, dimethyl sulfoxide, n-methyl pyrrolidone, glycerol,  
4     1,4 butane diol, polyethylene glycol, diethylene glycol butyl ether, ethylene glycol,  
5     diethylene glycol, propylene glycol, polypropylene glycol, polyethylene glycol ethers,  
6     polypropylene glycol ethers, tetraethyleneglycol ethers, butylene carbonate, pentanediol,  
7     hexanediol, and combinations thereof.

1       62.     The fluid of claim 60, further comprising:  
2              a surfactant.

1       63.     The fluid of claim 60, further comprising:  
2              a rheology modifier.

1       64.     The fluid of claim 60, further comprising:  
2              a first solvent having a first boiling point,  
3              wherein the first boiling point is lower than the second boiling point.

1       65.     The fluid of claim 64 wherein the first solvent is selected from the group  
2     consisting of ethanol, isopropanol, n-propanol, methanol, n-butanol, a glycol, an ester, a  
3     glycol-ether, a ketone, an aromatic, an aliphatic, an aprotic polar solvent, a terpene, an  
4     acrylate, a methacrylate, a vinyl ether, an oxetane, an epoxy, a low molecular weight  
5     polymer, carbonate, acetone, ethyl acetate, dimethyl succinate, and combinations thereof.

1       66.     The fluid of claim 60, further comprising:  
2              an amine.

1       67.     The fluid of claim 66 wherein the amine is selected from the group consisting of  
2     monoisopropanol amine, triethylamine, 2-amino-2-methyl-1-propanol, 1-amino-2-  
3     propanol, 2-dimethylamino-2-methyl-1-propanol, N,N-diethylethanolamine, N-  
4     methyldiethanolamine, N,N-dimethylethanolamine, triethanolamine, 2-aminoethanol, 1-  
5     [bis[3-(dimethylamino)propyl]amino]-2-propanol, 3-amino-1-propanol, 2-(2-  
6     aminoethylamino)ethanol, tris(hydroxymethyl)aminomethane, 2-amino-2-ethyl-1,3-  
7     propanediol, 2-amino-2-methyl-1,3-propanediol, diethanolamine, 1,3-

8 bis(dimethylamino)-2-propanol, ammonium hydroxide, monoethanolamine,  
9 aminomethylpropanol, aminoethylethanolamine, triisopropanolamine,  
10 polyoxypropylenetriamine, polyethyleneimine, and combinations thereof.

1 68. A fluid for three-dimensional printing, the fluid comprising:  
2 water; and  
3 an amine,  
4 wherein the fluid is adapted to activate the adhesive properties of at least a  
5 sparingly soluble alkaline-reducible particulate material.

1 69. The fluid of claim 68 wherein the amine is selected from the group consisting of  
2 monoisopropanol amine, triethylamine, 2-amino-2-methyl-1-propanol, 1-amino-2-  
3 propanol, 2-dimethylamino-2-methyl-1-propanol, N,N-diethylethanolamine, N-  
4 methyldiethanolamine, N,N-dimethylethanolamine, triethanolamine, 2-aminoethanol, 1-  
5 [bis[3-(dimethylamino)propyl]amino]-2-propanol, 3-amino-1-propanol, 2-(2-  
6 aminoethylamino)ethanol, tris(hydroxymethyl)aminomethane, 2-amino-2-ethyl-1,3-  
7 propanediol, 2-amino-2-methyl-1,3-propanediol, diethanolamine, 1,3-  
8 bis(dimethylamino)-2-propanol, ammonium hydroxide, monoethanolamine,  
9 aminomethylpropanol, aminoethylethanolamine, triisopropanolamine,  
10 polyoxypropylenetriamine, polyethyleneimine, and combinations thereof.

1 70. The fluid of claim 68, further comprising:  
2 a first solvent having a first boiling point.

1 71. The fluid of claim 70 wherein the first solvent is selected from the group  
2 consisting of ethanol, isopropanol, n-propanol, methanol, n-butanol, a glycol, an ester, a  
3 glycol-ether, a ketone, an aromatic, an aliphatic, an aprotic polar solvent, a terpene, an  
4 acrylate, a methacrylate, a vinyl ether, an oxetane, an epoxy, a low molecular weight  
5 polymer, carbonate, acetone, ethyl acetate, dimethyl succinate, and combinations thereof.

1 72. The fluid of claim 70, further comprising:  
2 a second solvent having a second boiling point,  
3 wherein the second boiling point is higher than the first boiling point.

1   73.   The fluid of claim 72 wherein the second solvent is selected from the group  
2   consisting of butyrolactone, glycerol carbonate, propylene carbonate, ethylene carbonate,  
3   dimethyl succinate, dimethyl sulfoxide, n-methyl pyrrolidone, glycerol,  
4   1,4 butane diol, polyethylene glycol, diethylene glycol butyl ether, ethylene glycol,  
5   diethylene glycol, propylene glycol, polypropylene glycol, polyethylene glycol ethers,  
6   polypropylene glycol ethers, tetraethyleneglycol ethers, butylene carbonate, pentanediol,  
7   hexanediol, and combinations thereof.

1   74.   The fluid of claim 68, further comprising:  
2         a surfactant.

1   75.   The fluid of claim 68, further comprising:  
2         a rheology modifier.

1   76.   A method for forming an article by three-dimensional printing, the method  
2   comprising the steps of:  
3             providing a plurality of adjacent particles having a mean diameter of about 10  
4   micrometers to about 100 micrometers, the particles comprising a blend of a  
5   thermoplastic particulate material and an adhesive particulate material; and  
6             applying to the plurality of particles a fluid, within which the adhesive particulate  
7   material is at least partially soluble and the thermoplastic particulate material is  
8   substantially inert, the fluid activating the adhesive particulate material from a  
9   substantially inert state, in an amount sufficient to bond the plurality of particles together  
10   to define a substantially solid, singular article.

1   77.   The method of claim 76, further comprising:  
2         heating the article to at least partially sinter the thermoplastic particulate material.

1   78.   A method for forming an article by three-dimensional printing, the method  
2   comprising the steps of:  
3             providing a plurality of adjacent particles having a mean diameter of about 10  
4   micrometers to about 100 micrometers, the particles comprising a blend of a  
5   thermoplastic particulate material and an adhesive particulate material; and

6 applying to the plurality of particles a fluid, within which the adhesive particulate  
7 material is at least partially soluble and the thermoplastic particulate material is  
8 substantially inert, the fluid dissolving the adhesive particulate material, in an amount  
9 sufficient to bond the plurality of particles together to define a substantially solid,  
10 singular article.

1 79. The method of claim 78, further comprising:  
2 heating the article to at least partially sinter the thermoplastic particulate material.

1 80. A method for forming an article by three-dimensional printing, the method  
2 comprising the steps of:

3 applying, to a first portion of a first film of particles that includes a plurality of  
4 thermoplastic particles and an activatable adhesive, an aqueous fluid that activates the  
5 adhesive in an amount sufficient to form an essentially solid, singular article of adhered  
6 particles;

7 forming a second film of the particles on the first film; and

8 applying, to a first portion of the second film of particles, the aqueous fluid in an  
9 amount sufficient to activate the adhesive to the extent that the particles within the first  
10 portion of the second film adhere to each other and to at least a portion of the first portion  
11 of the first film to form an essentially solid, singular article from the first portion of the  
12 first film and the first portion of the second film.

1 81. The method of claim 80, further comprising:

2 heating the article to at least partially sinter the thermoplastic particulate material.

1 82. A method for forming an article by three-dimensional printing, the method  
2 comprising the steps of:

3 applying, to a first portion of a first film of particles that includes a plurality of  
4 thermoplastic particles, a non-aqueous fluid that activates the surface of the thermoplastic  
5 particles in an amount sufficient to form an essentially solid, singular article of adhered  
6 particles;

7 forming a second film of the particles on the first film;

8               applying, to a first portion of the second film of particles, the non-aqueous fluid in  
9   an amount sufficient to activate the surface of the thermoplastic particles to the extent  
10   that the particles within the first portion of the second film adhere to each other and to at  
11   least a portion of the first portion of the first film to form an essentially solid, singular  
12   article from the first portion of the first film and the first portion of the second film; and  
13   applying at least one of an ultraviolet light, visible light, heat, and an electron beam on  
14   the printed layer to induce the non-aqueous fluid to solidify.

1   83.   An article comprising:  
2        a product of:  
3                a powder, the powder comprising:  
4                       (i) a thermoplastic particulate material, and  
5                       (ii) an adhesive particulate material, and  
6                a fluid that activates the adhesive particulate material to form a  
7   substantially solid article composed of the powder, the adhesive particulate material  
8   being substantially soluble in the fluid,  
9   wherein the article includes a plurality of adjacent layers formed by the product, each  
10   layer having a contour defining an edge, and a final shape of the article being defined by  
11   respective edges of the layers.

1   84.   The article of claim 83 wherein the powder includes a filler material.

1   85.   The article of claim 83 wherein the powder includes a processing aid material.

1   86.   The article of claim 83 wherein the article further comprises an infiltrant.

1   87.   The article of claim 86 wherein the infiltrant is selected from the group consisting  
2   of epoxy-amine systems, free radical UV cure acrylate systems, cationic UV cure epoxy  
3   systems, two-part urethane systems including isocyanate-polyol and isocyanate-amine,  
4   cyanoacrylate, and combinations thereof.